

# Alternative Measures of Price Change for GNP

This article reviews the rapid and widespread rise in prices since 1965 as shown by the deflators for total GNP and its major components, describes the derivation of alternative price indexes based on fixed weights, and contrasts the behavior of the two types of price measures. The analysis shows that the fixed weighted price indexes for total GNP have increased at the same rate as the implicit GNP deflator over the past 3 years. However, within this period, the alternative price measures have on occasion moved differently from the deflator.

THE implicit price deflators for GNP, a byproduct of the calculation of real GNP, have received increased use over the past several years. Unlike conventional price indexes, such as the Consumer Price Index and the Wholesale Price Index, which combine prices of individual items with fixed weights, these deflators employ shifting weights.

This article reviews the rapid and widespread rise in prices since 1965 as shown by the deflators for total GNP and its major components, describes the derivation of alternative price indexes based on fixed weights, and contrasts the behavior of the two types of measures.

The study finds that the implicit deflator for total GNP has increased at the same rate as fixed weighted price indexes over the past 3 years. Within this span, however, the alternative price measures have on occasion moved differently from the deflator. Differences were particularly pronounced in the second and third quarters of 1968.

## Price Changes, 1965-68

Over the past 3 years, the total GNP deflator has increased at an annual rate of 3½ percent, and over the past six quarters, the rate has accelerated to

almost 4 percent. The latest quarter shows no slackening in the degree of inflation on an overall basis (chart 15). The fourth quarter increase in the deflator for personal consumption expenditures was the largest since the fourth quarter of 1951. The rate of price increase for fixed investment and government purchases of goods and services declined from that of preceding quarters, but in the case of government purchases, the smaller rise represented a reduction from an unusually large third quarter advance that was due to a July pay raise for Federal Government employees.

Price changes in recent years stand in marked contrast to those in the first half of the 1960's, when the economy was operating below its potential. From 1960 to 1965, the GNP deflator increased at an annual rate of 1.4 percent; over the same period, the deflators for personal consumption expenditures and fixed investment increased at an average

annual rate of 1.1 percent and the deflator for government purchases, 2.6 percent.

Although 1965 witnessed a moderate step-up in the price rise, the transition to the period of strong inflationary increases occurred about the end of the year and is associated with the pressures on the economy resulting from the Vietnam buildup. From the fourth quarter of 1965 to the fourth quarter of 1968, the deflators for total GNP, fixed investment, and government purchases increased at an annual rate of 3½ percent, while the deflator for personal consumption expenditures rose 3½ percent (table 1). Price increases during the period were not uniform (columns 2-4 of table 1). Three fairly distinct subperiods may be distinguished. From the fourth quarter of 1965 to the fourth quarter of 1966, the overall deflator showed a sharp rise of 3½ percent. With the slowdown in the

Table 1.—Changes in Implicit Deflators for GNP and Major Components and Contributions of Major Components to Total Change, Selected Periods

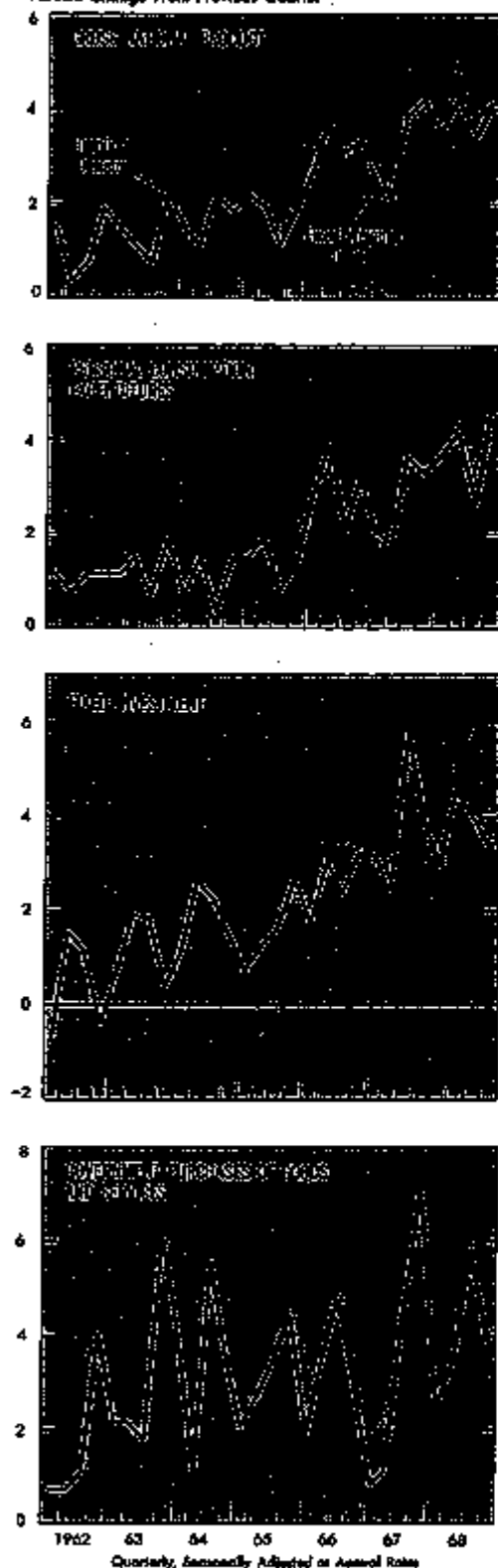
	Percent change at annual rate				Contributions of major components			
	IV-1965 to IV-1966	IV-1966 to II-1967	II-1967 to IV-1968	IV-1965 to IV-1968	IV-1965 to IV-1966	IV-1966 to II-1967	II-1967 to IV-1968	IV-1965 to IV-1968
Gross national product <sup>1</sup> .....	3.27	2.48	3.93	3.47	3.27	2.43	3.33	3.47
Personal consumption expenditures.....	3.82	1.32	3.78	3.15	.46	4.32	1.42	1.83
Durable goods.....	.88	.02	3.01	1.77	-.15	.52	.90	.30
Nondurable goods.....	3.46	1.23	3.88	3.16	.23	1.38	.21	.42
Services.....	3.91	3.38	4.22	3.77	.03	2.02	.91	.97
Gross private domestic investment.....								
Fixed investment.....	2.82	2.84	4.12	3.40	-.35	-.22	1.02	.37
Nonresidential.....	2.92	2.84	3.23	2.82	-.58	-.48	.44	.34
Structures.....	3.59	3.29	3.16	4.34	-.13	-.30	.05	-.05
Producers' durable equipment.....	3.11	2.12	2.78	2.75	.72	-.15	.88	.40
Residential.....	3.26	4.15	5.01	4.78	-.94	.24	.58	.68
Change in business inventories.....								
Net exports of goods and services.....								
Exports.....	4.54	-.43	1.61	2.15	-.25	-.30	.30	.13
Imports.....	1.14	-8.47	1.62	.81	-.48	-.15	-.45	-.41
Government purchases of goods and services.....	3.38	.86	4.88	3.50	1.89	3.25	1.08	1.86
Federal.....	2.10	-.20	4.56	2.93	1.05	2.15	.62	.91
State and local.....	4.66	2.71	4.84	4.17	.81	1.10	.88	.76

1. Includes change in business inventories.

CHART 15

## Implicit Price Deflators Compared With Fixed Weighted Price Indexes

Percent Change From Previous Quarter



Note.—Expenditures in 4th quarter 1965 used as weights in fixed weighted price indexes.

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economy after the end of 1966, the pace of the price advance slackened, averaging 2½ percent from the fourth quarter of 1966 to the second of 1967. However, the retardation in both the expansion and the price rise was short lived; over the past year and a half, the overall deflator has advanced at an annual rate of almost 4 percent. In the third quarter of 1968, the rate of increase fell to 3½ percent, largely as a result of smaller rises in prices of food and services than in the second quarter. The more rapid rate of increase was resumed in the fourth quarter.

#### Changes in component deflators

The implicit deflator for personal consumption expenditures shows the same pattern as that for total GNP in the three subperiods (table 1), but in each, it increased at a less than average pace. Moreover, there has not been much uniformity in the price changes for the major components of the consumption deflator.

The deflator for consumer durable goods including automobiles showed little movement from the fourth quarter of 1965 to the second quarter of 1967. It rose at an annual rate of about 3 percent over the most recent six quarters, with auto prices rising somewhat more rapidly than other durable goods. From the fourth quarter of 1965 to the fourth quarter of 1966, the deflator for consumer nondurable goods increased more rapidly than that for total personal consumption expenditures, but in the second and third subperiods in table 1, its rise was less rapid. This pattern reflected principally the behavior of food prices. The price index for food consumed at home, which accounts for about one-third of non-durable expenditures, increased 4½ percent during 1966, and then declined 3½ percent at an annual rate in the first half of 1967. Since mid-1967, food prices have risen at a 3½ rate, below the average for all consumption outlays. Nondurables other than food advanced at a below-average pace during 1966 and at an above-average rate since then. The deflator for service expenditures advanced steadily through mid-1967 but since that time has increased at a more rapid rate.

During the first two subperiods in table 1, the deflator for fixed investment moved up at a fairly steady annual rate of 2¾ percent; however, in the third subperiod, it increased over 4 percent, with the acceleration due to higher prices for both construction and equipment. The rise in the deflators for construction was unusually sharp, reflecting especially large increases in wage rates for workers in building trades starting in the summer of 1967. The deflator for equipment, which had shown considerable retardation in the slowdown period, also showed a substantial step-up but did not match the price rise during 1966.

The rate of increase in the deflator for government purchases of goods and services has varied considerably over the three subperiods. After a 3½ percent rate of increase in 1966, the rate fell back to 1 percent in the first half of 1967, and then moved up to 4½ percent since mid-1967. Changes in the deflator for Federal purchases are especially variable. The increases in the first and third subperiods reflect Federal pay raises, which took effect in the latter half of each year included in the study.

In addition to the changes in the deflators shown on the left, table 1 shows on the right the contributions of each of the GNP components to the change in the overall deflator.

#### Construction of the Indexes

The implicit deflator for total GNP is obtained as the ratio of GNP in current prices to GNP in constant prices. It is a weighted average of the price indexes used to deflate the components of GNP; the implicit weights are expenditures in the current period valued in prices of the base year 1958.

Conceptually, the implicit deflator is a Paasche price index. For period  $t$ , the implicit deflator (ID) is

$$ID_t = \frac{\sum P_t W_t}{\sum P_{58} W_t} = \frac{\sum P_t P_{58} Q_t}{\sum P_{58} P_{58} Q_t} = \frac{\sum P_t Q_t}{\sum P_{58} Q_t}$$

where the  $W$ 's represent expenditure weights, the  $P$ 's represent prices, the  $Q$ 's quantities, where the summations are over all the goods and services in GNP, and where 1958 is taken as the

price base. As can be seen in the equation, the implicit deflator measures the price change of the current period ( $t$ ) quantities or "market basket" since 1958. However, the market basket for, say period  $t+1$  or  $t-1$  is not necessarily the same as that in period  $t$ . Consequently, a comparison of the deflator for period  $t$  with any period other than the base year measures both the effect of the difference between the weights in the two periods and the change in the price of a fixed market basket.

In practice, the implicit deflator is only an approximation of a Paasche price index. The deflation is not performed at the level of individual commodities as indicated in the equation above. Instead, components that encompass expenditures on an array of commodities are deflated.<sup>1</sup> The components are deflated with conventional, fixed weighted price indexes that combine price relatives for individual types of commodities included in the expenditure component. Therefore, the implicit deflator involves current period weighting among the component price indexes, as in a Paasche index, and fixed weighting within the components.

For comparison with the implicit deflator, special fixed weighted indexes and a chain index were constructed from the component price indexes used to deflate the GNP. Two fixed weighted price indexes were computed, using as weights (1) expenditures in 1958 and (2) expenditures in the fourth quarter of 1965.<sup>2</sup>

The chain index was obtained as a cumulation of quarter-to-quarter percentage changes. In each quarterly change, the price changes were weighted by expenditures in the first of the two quarters involved in the change. The chain index provides a basis for com-

paring the quarterly changes in the implicit deflator with quarterly changes in which the weights for each comparison are expenditures in the preceding period.

Some of the component price indexes used in the deflation of GNP present specification problems that impair their usefulness as measures of price change. An important case is the unit value indexes used to deflate the components of exports and imports. The commodity classes for which unit values are obtained are not always adequately specified; for instance, often no distinctions are made among grades of a given commodity. As a result, the unit value indexes reflect changes in composition within the commodity classes as well as changes in prices. It may be noted

that these deficiencies in the basic data probably account for a significant part of the short-term variations in the price changes shown for imports and exports.

### Inventory investment and net exports

The commodity composition of inventory investment varies sharply from period to period, and as a result, there is no "representative" or "typical" composition of inventory investment. Price indexes for this series are not very useful and, accordingly, no entries are shown in the tables for inventory investment or for gross private domestic investment, of which inventory investment is sometimes an important component. For similar reasons no entries are shown for net exports.

Table 2.—Changes in Fixed Weighted Price Indexes for GNP and Major Components and Contributions of Major Components to Total Change, Selected Periods

	Percent change at annual rate				Contributions of major components			
	IV-1966 to IV-1966	IV-1966 to II-1967	II-1967 to IV-1968	IV-1968 to IV-1968	IV-1966 to IV-1966	IV-1966 to II-1967	II-1967 to IV-1968	IV-1968 to IV-1968
<b>A. 1958 weights</b>								
Gross national product <sup>1</sup> .....	3.37	2.09	4.15	3.95	3.37	2.09	4.15	3.95
Personal consumption expenditures.....	3.16	1.30	3.32	3.28	3.01	1.21	2.43	2.06
Durable goods.....	.68	.43	3.12	1.81	.04	.08	.23	.35
Nondurable goods.....	3.07	1.14	3.01	3.23	1.11	.35	1.09	.97
Services.....	3.31	3.23	4.27	3.77	.86	.88	1.11	.98
Gross private domestic investment.....								
Fixed investment.....	3.31	3.28	4.08	3.09	.46	.45	.65	.53
Nonresidential.....	3.31	2.79	3.95	3.06	.30	.24	.35	.32
Structures.....	3.61	2.85	4.95	4.16	.14	.11	.39	.18
Producers' durable equipment.....	3.09	2.75	3.23	3.11	.16	.14	.17	.15
Residential.....	3.30	4.15	5.90	4.79	.16	.20	.29	.23
Change in business inventories.....								
Net exports of goods and services.....								
Exports.....	4.06	-.84	1.51	2.24	.22	-.04	.07	.30
Imports.....	1.07	-3.73	1.79	.61	-.06	.15	-.03	-.03
Government purchases of goods and services.....	3.24	1.44	4.36	3.81	.75	.34	1.12	.87
Federal.....	1.05	.24	5.85	3.85	.24	.04	.63	.42
State and local.....	4.06	2.00	4.49	4.39	.51	.30	.49	.45
<b>B. 4th quarter 1965 weights</b>								
Gross national product <sup>1</sup> .....	3.44	2.14	4.09	3.52	3.44	2.14	4.09	3.52
Personal consumption expenditures.....	3.09	1.59	3.80	3.21	1.89	1.19	2.39	2.02
Durable goods.....	.80	.18	3.05	1.81	.08	.02	.29	.17
Nondurable goods.....	4.50	1.37	3.65	3.19	.77	.35	1.01	.89
Services.....	3.51	3.21	4.27	3.77	.84	.63	1.09	.96
Gross private domestic investment.....								
Fixed investment.....	3.27	3.00	4.63	3.05	.46	.44	.66	.56
Nonresidential.....	3.27	2.55	3.99	3.61	.35	.28	.45	.38
Structures.....	4.10	2.73	5.34	4.49	.16	.11	.31	.18
Producers' durable equipment.....	2.79	2.47	3.15	2.99	.19	.17	.22	.20
Residential.....	3.26	4.15	6.01	4.78	.13	.18	.28	.15
Change in business inventories.....								
Net exports of goods and services.....								
Exports.....	4.06	-.70	1.51	2.22	.27	-.04	.03	.13
Imports.....	1.15	-3.83	1.69	.67	-.06	.15	-.03	-.03
Government purchases of goods and services.....	3.72	1.39	4.39	4.82	.75	.40	.81	.81
Federal.....	2.61	1.11	5.63	3.75	.28	.11	.53	.47
State and local.....	4.79	2.82	4.40	4.27	.49	.29	.48	.44

1. Includes changes in business inventories.

1. On a quarterly basis, 142 components of GNP are deflated as shown below.

Gross national product.....	142
Personal consumption expenditures.....	41
Private fixed investment.....	42
Change in business inventories.....	10
Exports.....	3
Imports.....	3
Government purchases of goods and services.....	46

2. Tests showed that alternative weight bases, selected from the quarters from 1966 to 1968, have little effect on the fixed weighted GNP price index.

### Highlights of the Comparisons

The fixed weighted price indexes for total GNP increased at the same rate as the implicit GNP deflator over the 3 years following the fourth quarter of 1965. Regardless of the measure used, the overall level of prices rose 3½ percent per year over this period.

Over some shorter spans within the 3-year period, the fixed weighted in-

dexes for total GNP have moved differently from the implicit GNP deflator. As is shown below, the fixed weighted indexes indicate a somewhat greater retardation in the rate of inflation in the first half of 1967 and a slightly more rapid increase in the second half of 1967 and in the year 1968.

In the first half of 1967, the fixed weighted indexes increased at a rate

ranging from 2 to 2½ percent as compared with the 2½-percent rate in the implicit GNP deflator. Since the second quarter of 1967, the annual rate of increase in the fixed weighted indexes has been over 4 percent as compared with a rate of 3.9 percent for the implicit deflator.

Changes in fixed weighted indexes for total GNP and its components are shown on the left-hand side of table 2;

Table 3.—Price Changes as Measured by Implicit Deflators, Fixed Weighted Price Indexes, and Chain Indexes, Quarterly, Second Quarter 1965 through 1968

(Percent change at annual rate)

	1966												1967			
	II				III				IV				I			
	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain
Gross national product.....	1.49	2.20	2.08	1.89	1.18	1.72	1.38	1.46	1.84	2.71	2.49	2.81	2.81	2.45	2.27	2.27
Personal consumption expenditures.....	1.94	2.05	1.83	1.83	.89	1.27	.97	1.41	1.34	2.44	1.67	1.62	2.88	2.25	2.11	2.11
Durable goods.....	-1.21	-.74	-1.10	-1.22	-3.85	-3.65	-3.22	-3.68	-1.54	-.01	-1.41	-1.48	-2.87	-2.44	-2.63	-2.63
Nondurable goods.....	2.76	2.79	2.74	2.77	2.19	2.42	2.26	2.29	2.70	2.06	2.88	2.89	2.27	2.84	2.11	2.11
Services.....	1.91	2.03	2.00	2.01	1.41	1.61	1.36	1.37	1.90	1.43	1.38	1.39	2.12	2.09	2.19	2.12
Gross private domestic investment.....																
Fixed investment.....	1.20	1.28	1.41	1.30	1.58	2.41	1.81	1.87	2.70	2.54	2.29	2.20	1.75	2.25	2.23	2.23
Nonresidential structures.....	1.71	1.35	1.51	1.27	1.18	1.97	1.31	1.35	3.12	2.83	2.27	2.29	1.77	2.17	2.22	2.22
Producers' durable equipment.....	2.98	1.77	2.55	2.28	5.34	5.32	4.47	4.71	4.44	4.41	3.80	3.83	1.82	1.82	2.56	2.56
Residential structures.....	.42	1.86	.93	.80	-.64	-.44	-.45	-.62	1.78	1.26	1.41	1.40	1.88	2.58	2.18	2.18
Change in business inventories.....	1.11	1.06	1.11	1.11	2.25	2.24	2.25	2.25	2.28	2.26	2.23	2.24	2.25	2.29	2.25	2.25
Net exports of goods and services.....																
Exports.....	-.84	-.27	-.24	-.10	1.18	1.26	1.17	1.15	-.77	-.87	-.98	-.98	3.35	2.35	2.39	2.39
Imports.....	-1.72	-1.09	-1.19	-1.15	6.96	7.84	7.02	7.02	3.10	2.89	2.98	2.99	-.82	-.88	-.85	-.85
Government purchases of goods and services.....	2.78	2.85	2.72	2.73	2.42	2.65	2.68	2.69	4.47	5.43	4.72	4.68	1.97	2.36	2.18	2.18
Federal.....	1.12	1.78	1.27	1.25	3.33	3.44	3.83	3.82	7.60	8.66	7.55	7.45	-1.18	1.80	1.24	1.24
State and local.....	4.38	4.28	4.12	4.16	3.44	3.83	3.73	3.77	1.82	2.14	2.11	2.10	5.12	6.34	5.07	5.07

	1968												1967			
	II				III				IV				I			
	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain
Gross national product.....	3.78	2.50	2.74	2.81	3.12	3.05	3.04	3.04	3.38	2.44	2.45	2.67	2.92	1.82	2.04	2.25
Personal consumption expenditures.....	3.51	3.68	3.45	3.44	2.81	3.42	2.23	2.26	3.28	3.29	3.24	3.24	2.02	1.63	1.68	1.68
Durable goods.....	1.93	1.90	1.61	1.63	1.17	1.13	1.05	1.13	3.07	3.40	3.16	3.12	.29	-.70	-.99	-.12
Nondurable goods.....	3.85	4.11	3.90	3.99	2.11	2.44	2.15	2.15	2.62	2.81	2.75	2.77	.86	.63	.69	.53
Services.....	3.61	3.58	3.58	3.55	2.73	2.77	2.76	2.78	3.77	3.50	3.58	3.50	3.41	2.30	2.20	2.19
Gross private domestic investment.....																
Fixed investment.....	3.08	3.94	3.80	3.79	2.38	3.58	3.41	3.31	3.29	3.44	3.54	3.82	2.24	2.90	2.89	2.94
Nonresidential structures.....	3.25	4.02	3.81	3.79	2.44	3.29	3.16	3.06	4.15	3.78	3.80	3.85	3.58	3.89	3.02	2.99
Producers' durable equipment.....	5.79	5.00	5.31	5.31	4.72	5.35	5.22	5.66	3.07	2.62	2.77	2.81	3.40	2.31	2.22	2.31
Residential structures.....	3.27	3.31	2.95	2.94	1.82	1.88	1.04	1.07	3.72	4.08	4.41	4.42	2.73	3.57	3.50	3.44
Change in business inventories.....	3.79	3.82	3.79	3.79	4.89	4.14	4.09	4.00	2.84	2.85	2.81	2.82	2.58	2.53	2.52	2.49
Net exports of goods and services.....																
Exports.....	5.52	6.18	6.17	6.17	3.42	3.45	3.42	3.41	5.95	5.75	5.70	5.83	1.16	1.19	1.16	1.15
Imports.....	3.64	3.68	3.60	3.60	3.13	3.13	3.13	3.13	-1.55	-1.59	-1.59	-1.55	-3.79	-2.74	-4.11	-4.10
Government purchases of goods and services.....	3.56	2.99	4.04	4.22	4.84	4.38	3.03	3.39	2.92	2.41	2.65	2.87	.39	.59	1.77	2.33
Federal.....	3.20	1.60	3.47	4.19	4.31	2.89	5.08	4.87	2.11	1.80	1.77	2.00	.48	-.80	1.00	2.59
State and local.....	4.19	4.72	4.46	4.44	5.86	6.12	6.95	6.90	3.49	2.77	3.68	3.74	1.80	2.88	2.48	2.46

contributions of each component to the overall price change appear on the right. The time periods are the same as those in table 1.

Over the last six quarters, the largest differences between the quarter-to-quarter changes in the two types of indexes occurred in the second and third quarters of 1968. The fixed weighted indexes increased about  $\frac{1}{4}$  of a per-

(Percent change at annual rate)

	IV-1965 to IV-1966	IV-1966 to II-1967	II-1967 to IV-1968	IV-1965 to IV-1968
Implicit deflator.....	3.3	2.5	2.9	3.5
Fixed weighted: 1965 weights.....	2.4	2.1	4.2	2.6
IV-1965 weights.....	2.4	2.2	4.1	2.5

centage point more than the implicit deflator in the second quarter and

about  $\frac{1}{4}$  to  $\frac{1}{2}$  of a percentage point more in the third. The table below shows the changes over the three most recent quarters.

The differences in the second and third quarters between the implicit deflator and the fixed weighted indexes are among the largest in the 12-quarter period since the start of 1966. For about one-half of the quarterly

Table 3.—Price Changes as Measured by Implicit Deflators, Fixed Weighted Price Indexes, and Chain Indexes, Quarterly, Second Quarter 1965 through 1968—Continued

	1967												1968			
	II				III				IV				I			
	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain
Gross national product.....	2.07	1.96	2.29	2.32	2.99	4.99	2.83	2.73	4.26	4.17	4.18	4.26	3.54	1.82	3.39	3.88
Personal consumption expendi- tures.....	1.83	2.17	2.17	2.23	2.49	3.30	2.28	3.26	3.32	3.23	3.46	3.43	3.74	4.08	4.83	3.39
Durable goods.....	-1.35	1.15	1.24	1.24	4.71	5.57	4.73	4.52	3.37	3.59	4.05	3.96	2.11	2.25	2.24	2.00
Nondurable goods.....	1.90	1.78	1.86	1.92	3.13	2.98	3.00	3.01	2.57	2.84	2.74	2.79	4.45	3.75	3.73	3.72
Services.....	3.30	3.23	3.33	3.24	3.26	3.05	3.05	3.05	3.82	3.88	3.57	3.90	4.70	4.09	4.06	4.95
Gross private domestic invest- ment.....																
Fixed investment.....	2.44	2.63	3.13	2.92	5.82	6.33	5.53	5.12	4.89	3.44	3.77	3.67	3.92	3.09	3.02	3.06
Nonresidential.....	1.16	2.30	2.15	2.19	3.35	3.67	3.45	3.33	3.88	3.94	4.17	3.93	3.45	3.60	3.35	3.49
Structures.....	3.28	2.40	2.34	3.36	6.09	5.29	5.24	5.29	3.13	2.94	3.09	2.14	2.59	1.42	1.22	1.39
Producers' durable equip- ment.....	1.69	1.83	1.66	1.57	1.50	1.78	1.84	1.96	4.91	4.51	4.82	4.40	3.19	3.23	4.02	4.39
Residential structures.....	5.84	5.81	5.35	5.38	11.64	11.60	11.64	11.92	2.98	2.69	2.67	2.67	2.13	2.12	2.12	2.18
Change in business inven- tories.....																
Net exports of goods and services.....																
Exports.....	-2.45	-2.44	-2.51	-2.32	.58	.97	.99	.99	1.67	2.02	2.04	2.03	-6.53	-6.54	-6.33	-7.03
Imports.....	-3.55	-3.78	-3.53	-3.57	.90	.27	.03	.13	1.90	1.26	.92	1.03	-.99	1.18	1.10	1.10
Government purchases of goods and services.....																
Federal.....	1.10	2.89	2.21	2.24	4.22	4.40	4.36	4.15	7.14	7.31	6.96	6.85	2.65	4.15	3.98	3.97
State and local.....	-3.57	3.21	3.15	3.16	6.45	6.39	6.13	5.97	3.68	3.50	3.39	3.27	3.15	3.06	3.54	3.50
1968																
	II				III				IV							
	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain	Implicit deflator	1965 weights	IV-1965 weights	Chain
Gross national product.....	4.23	5.17	5.13	5.06	3.46	4.06	3.85	3.80	4.15	4.15	4.16	4.17				
Personal consumption expenditures.....	4.15	4.91	4.95	4.84	2.55	3.97	3.62	3.91	4.55	4.45	4.44	4.45				
Durable goods.....	1.94	2.01	1.64	1.63	1.68	2.20	2.12	2.13	3.77	3.36	3.43	3.45				
Nondurable goods.....	4.06	4.99	5.04	4.97	2.89	2.89	2.84	2.83	4.39	4.43	4.44	4.58				
Services.....	5.29	5.35	5.39	5.41	3.52	3.53	3.53	3.53	4.78	4.80	4.81	4.82				
Gross private domestic investment.....																
Fixed investment.....	4.65	5.85	5.43	5.23	3.98	5.27	4.05	5.05	5.24	5.15	5.31	5.21				
Nonresidential.....	3.27	4.49	4.35	4.20	2.88	4.80	4.94	4.51	5.13	5.31	5.61	5.43				
Structures.....	8.06	7.16	7.42	7.47	5.09	8.89	10.08	9.74	3.25	3.83	4.21	4.10				
Producers' durable equip- ment.....	1.82	2.57	2.56	2.58	1.44	2.19	1.99	2.03	3.45	3.26	3.26	3.12				
Residential structures.....	8.40	8.41	8.40	8.40	9.06	9.03	9.09	9.09	2.62	2.51	2.52	2.51				
Change in business inventories.....																
Net exports of goods and services.....																
Exports.....	14.97	14.66	14.97	14.67	-3.75	-3.94	-3.95	-3.97	5.84	4.32	4.28	4.28				
Imports.....	8.20	5.68	5.56	5.59	-1.44	-1.39	-1.37	-1.37	4.25	3.66	4.00	4.02				
Government purchases of goods and services.....																
Federal.....	3.34	3.91	4.19	3.30	5.79	6.17	5.94	5.73	9.09	8.56	8.96	8.87				
State and local.....	1.63	2.80	2.94	2.84	7.62	8.01	8.23	7.95	3.15	3.34	3.14	3.04				
State and local.....	5.62	5.44	5.39	5.35	2.95	3.90	3.28	3.42	4.27	4.71	4.74	4.74				

(Percent change at annual rate)

	II-1968	III-1968	IV-1968
Implicit deflator.....	4.8	3.6	4.1
Fixed weighted: 1958 weights.....	5.2	4.1	4.9
IV-1968 weights.....	5.1	3.8	4.2
Chain.....	5.1	3.8	4.2

changes, the differences between the two types of indexes were less than 0.2 percentage points. In most quarters, the chain index moves about the same as the fixed weighted indexes (table 3).

### Effect of weight changes

The differences between the changes in the implicit deflator and the fixed weighted indexes shown in the article are due to the shift in the weights in the implicit deflator. If the composition of expenditures shifts toward those components that have increased in price at an above-average rate since the price base period of 1958, the implicit deflator increases more than a fixed weighted index. If the composition shifts in the other direction, the implicit deflator increases less than a fixed weighted index.<sup>3</sup>

The effect of changes in the composition of real GNP on the implicit deflator is illustrated in an extreme form by the shifts in inventory investment. The price indexes for inventory investment show a much smaller rise since 1958 than the rest of GNP.

When inventory investment declines in relative importance, these price indexes receive less weight in the terminal period of the span than in the initial period, and the implicit GNP deflator tends to increase more than the fixed weighted price indexes for total GNP. When inventory investment increases in relative importance, the deflator rises less than the fixed weighted indexes.

3. Strictly speaking, the implicit deflator increases more (less) than a fixed weighted price index that has as its weight base the initial or terminal period of the span being compared if there is a positive (negative) correlation between the shifts in the weights in the implicit deflator and the changes since 1958 in the component price indexes. When the fixed weighted index has another period as its weight base, the difference also depends on the shift in the composition of real GNP between the weight base period and the initial or terminal period of the span being compared. However, the latter effect is of minor importance in the comparisons presented in this article because alternative weight bases have little effect on the fixed weighted index. (See also footnote 2.)

Shifts in inventory investment account for the difference between the changes in the two types of indexes from the fourth quarter of 1966 to the second quarter of 1967; over this period, inventory investment fell from an annual rate of \$19 billion (1958 prices) to \$2 billion. Changes in the indexes excluding and including inventory investment are shown below in the first and second columns respectively.

(Percent change at annual rate)

	IV-1966-II-1967	
Implicit deflator.....	2.2	2.6
Fixed weighted: 1958 weights.....	2.1	2.1
IV-1967 weights.....	2.2	2.2

Shifts in inventory investment account for much of the difference between the changes in the two types of indexes from the first to the second quarter of 1968, but in the third quarter, the shift operates in the opposite direction; recomputing the indexes excluding the change in inventories increases the difference in the third quarter changes. The difference in the third quarter changes is accounted for largely by a shift in the composition of real GNP from Federal purchases and construction, which have increased in price at above-average rates since 1958, to consumer durable goods and producers' durable equipment, which have increased in price at below-average rates.

### Major components

From the fourth quarter of 1965 to the fourth quarter of 1968, the prices of nonresidential fixed investment and government purchases increased more rapidly measured by fixed weighted price indexes than by the implicit deflators. For personal consumption expenditures, differences between the two price measures were small. The comparative movements are shown in the following table.

Over this period, the composition of real business fixed investment shifted toward producers' durable equipment, which on the average has increased less in price since 1958 than has nonresidential construction. Moreover, within each of these two broad categories of fixed investment, purchases have shifted

	Annual rate of change, IV-1966-IV-1968		
	Implicit deflator	Fixed weighted index, IV-1968 weights	Difference
Gross national product.....	3.5	3.5	0
Personal consumption expenditures.....	3.2	3.2	0
Durable goods.....	1.8	1.8	0
Nondurable goods.....	2.3	2.3	0
Services.....	2.8	2.8	0
Gross private domestic investment.....			
Fixed investment.....	2.4	2.8	-0.4
Nonresidential.....	2.0	2.5	-0.5
Structures.....	4.3	5.5	-1.2
Producers' durable equipment.....	2.6	2.9	-0.3
Residential structures.....	4.8	4.8	0
Change in business inventories.....			
Net exports of goods and services.....			
Exports.....	2.1	2.2	-0.1
Imports.....	1.5	1.5	0
Government purchases of goods and services.....	2.5	4.0	-1.5
Federal.....	2.9	2.8	0.1
State and local.....	4.2	4.8	-0.6

to those items that have increased in price less than their respective category averages.

Government purchases over the past 3 years have shifted toward the Federal sector, prices for which have risen considerably less since 1958 than prices of State and local output. (As compared with the Federal Government, State and local output is more heavily weighted by employee compensation and construction, prices of which as measured in the national accounts have risen much more than other types of government purchases.) Particularly, within the Federal sector there has been a pronounced relative shift in favor of goods and services that have risen less than the average for all Federal purchases; the shift to military equipment is the most notable case.

Some pronounced differences between the two types of indexes are evident within the 3-year period (chart 15). Some reflect changes in the composition of business fixed investment; others reflect the 1966-67 cutback and recovery in housing, a category that has shown especially large price increases since the 1958 base period. In the government sector, shifts in the CCC inventory position account for much of the quarterly differences.